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generating proposals by utilizing the input data, each said proposal comprising a collection of bids that can be awarded to a player participating in the auction, said bids being actual bids made and being considered simultaneously;

selecting a set of proposals such that each item is included in at most one selected proposal; and

informing the players bidding on the items of the result of said selecting a set of proposals.

4. (Twice Amended) A method according to claim 1, wherein said selecting a set of proposals is enabled by using an integer programming technique.

6. (Twice Amended) A method for selecting a set of bids in a combinatorial auction for at least two items involving at least one player and at least one type of bid for each player such that:

(a) each item is contained in at most one (or exactly one) selected bid;

(b) for each player, the selected bids all belong to the same type;

and among all collections of bids satisfying (a) and (b) the selected bids maximizing total revenue, said method comprising:

generating all valid proposals, said proposals comprising a collection of bids that can be awarded to a player participating in the auction, said bids being actual bids made and being considered simultaneously;

formulating an integer program that includes a column for each proposal, a constraint for each item and a constraint for each player, said constraints representing conditions (a) and (b)

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respectively, and an objective function which represents revenue;

solving the integer program for selecting the set of proposals that maximizes revenue;  
and

constructing a set of winning bids from the set of winning proposals.

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8. (Twice Amended) A method for selecting a set of bids in a combinational auction for at least two items involving at least one player and at least one type of bid for each player such that

- (a) each item is contained in at most one (or exactly one) selected bid;
- (b) for each player, the selected bids all belong to the same type;

and among all collection of bids satisfying (a) and (b) the selected bids maximized total revenue,  
said method comprising:

generating a set of valid proposals, each said proposal comprising a collection of bids that can be awarded to a player participating in the auction, said bids being actual bids made and being considered simultaneously;

formulating an integer program that includes a column for each proposal, a constraint for each item and a constraint for each player, said constraint representing conditions (a) and (b) respectively, and an objective function which represents revenue;

solving a linear programming relaxation of the integer program in said formulating an integer program for obtaining dual variables associated with each of the constraints;

using dual variables obtained in said solving a linear programming relaxation for determining the excess value associated with each bid, and a threshold for each player;

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using a proposal generation method for selecting each player and type, a proposal for which the excess value exceeds the threshold, or determining that no such proposal exists;

adding the proposal generated in said using a proposal generation method and repeating said solving a linear programming relaxation, said using dual variables, and said using a proposal generation method until no new proposals are identified;

solving the integer program that includes all identified proposals; and

constructing a set of winning bids from the set of winning proposals.

9. (Twice Amended) A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform method steps for executing a combinatorial auction, said method steps comprising:

reading input data comprising:

a plurality of items;

a player bidding on the items; and

a plurality of bids, where each bid specifies the player bidding, the amount bid, and the list of items included in the bid;

generating proposals by utilizing the input data, each said proposal comprising a collection of bids that can be awarded to a player participating in the auction, said bids being actual bids made and being considered simultaneously;

selecting a set of proposals such that each item is included in at most one selected proposal; and

informing the players bidding on the items of the result of said selecting a set of proposals.

10. (Twice Amended) A computer comprising:

- (1) means for reading input data comprising:  
a plurality of items;  
a player bidding on the items; and  
a plurality of bids, where each bid specifies the player bidding, the amount bid, and  
the list of items included in the bid;
- (2) means for generating proposals by utilizing the input data, each said proposal  
comprising a collection of bids that can be awarded to a player participating in the auction, said  
bids being actual bids made and being considered simultaneously;
- (3) means for selecting a set of proposals such that each item is included in at most one  
selected proposal;
- (4) means for informing the players bidding on the items of the results in said means for  
selecting.

**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE CLAIMS:**

1. (Twice Amended) A method for executing a combinatorial auction, the method comprising:

[(1)] reading input data comprising:

[(i)] a plurality of items;

[(ii)] a player bidding on the items; and

[(iii)] a plurality of bids, where each bid specifies the player bidding, the amount bid, and the list of items included in the bid;

[(2)] generating proposals by utilizing the input data, each said proposal comprising a collection of bids that can be awarded to a player participating in the auction, said bids being actual bids made and being considered simultaneously;

[(3)] selecting a set of proposals such that each item[s] is included in at most one selected proposal; and

[(4)] informing the players bidding on the items of the result of said selecting a set of proposals.

4. (Twice Amended ) A method according to claim 1, wherein [step (3)] said selecting a set of proposals is enabled by using an integer programming technique.

6. (Twice Amended) A method for selecting a set of bids in a combinatorial auction for at least two items involving at least one player and at least one type of bid for each player such that:

- (a) each item[s] is contained in at most one (or exactly one) selected bid;
- (b) for each player, the selected bids all belong to the same type;

and among all collections of bids satisfying (a) and (b) the selected bids maximizing total revenue, said method comprising:

[(1)] generating all valid proposals, said proposals comprising a collection of bids that can be awarded to a player participating in the auction, said bids being actual bids made and being considered simultaneously;

[(2)] formulating an integer program that includes a column for each proposal, a constraint for each item and a constraint for each player, said constraints representing conditions (a) and (b) respectively, and an objective function which represents revenue;

[(3)] solving the integer program for selecting the set of proposals that maximizes revenue;

and

[(4)] constructing a set of winning bids from the set of winning proposals.

8. (Twice Amended) A method for selecting a set of bids in a combinational auction for at least two items involving at least one player and at least one type of bid for each player such that

- (a) each item[s] is contained in at most one (or exactly one) selected bid;

(b) for each player, the selected bids all belong to the same type;  
and among all collection of bids satisfying (a) and (b) the selected bids maximized total revenue, said method comprising:

[(1)] generating a set of valid [porposals] proposals, each said proposal comprising a collection of bids that can be awarded to a player participating in the auction, said bids being actual bids made and being considered simultaneously;

[(2)] formulating an integer program that includes a column for each proposal, a constraint for each item and a constraint for each player, said constraint representing conditions (a) and (b) respectively, and an objective function which represents revenue;

[(3)] solving a linear programming relaxation of the integer program in said formulating an integer program for obtaining dual variables associated with each of the constraints;

[(4)] using dual variables obtained in said solving a linear programming relaxation for determining the excess value associated with each bid, and a threshold for each player;

[(5)] using a proposal generation method for selecting each player and type, a proposal for which the excess value exceeds the threshold, or determining that no such proposal exists;

[(6)] adding the proposal generated in said using a proposal generation method and repeating said solving a linear programming relaxation, said using dual variables, and said using a proposal generation method until no new proposals are identified;

[(7)] solving the integer program that includes all identified proposals; and

[(8)] constructing a set of winning bids from the set of winning proposals.

9. (Twice Amended) A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform method steps for executing a combinatorial auction, said method steps comprising:

[(1)] reading input data comprising:

[(i)] a plurality of items;

[(ii)] a player bidding on the items; and

[(iii)] a plurality of bids, where each bid specifies the player bidding, the amount bid, and the list of items included in the bid;

[(2)] generating proposals by utilizing the input data, each said proposal comprising a collection of bids that can be awarded to a player participating in the auction, said bids being actual bids made and being considered simultaneously;

[(3)] selecting a set of proposals such that each item[s] is included in at most one selected proposal; and

[(4)] informing the players bidding on the items of the result of said selecting a set of proposals.

10. (Twice Amended) A computer comprising:

(1) means for reading input data comprising:

[(i)] a plurality of items;

[(ii)] a player bidding on the items; and

[(iii)] a plurality of bids, where each bid specifies the player bidding, the amount bid, and the list of items included in the bid;

(2) means for generating proposals by utilizing the input data, each said proposal comprising a collection of bids that can be awarded to a player participating in the auction, said bids being actual bids made and being considered simultaneously;

(3) means for selecting a set of proposals such that each item is included in at most one selected proposal;

(4) means for informing the players bidding on the items of the results in said means for selecting.